Guide to Laboratory Testing and Interpretation

Laboratory testing should not be used to rule out measles. Only highly suspect cases that are clinically compatible should be recommended for testing. IgM and IgG serology, viral culture, and RT-PCR should *all* be performed for highly suspect cases.

Serology:

All serum samples should be tested for both IgM and IgG to assist in identifying false positive IgM tests.

Availability

- ARUP, LabCorp, and Quest all perform measles IgM and IgG testing.
- UPHL does not perform any testing for measles.

Limitations

- There are 2 methods for serological testing: direct capture and indirect capture. All but one commercially available tests are indirect capture tests. Indirect capture requires that serum samples be processed prior to testing to remove IgG and rheumatoid factor. Incomplete removal or problems with processing the sample can lead to false positive results. The direct capture method, which is used by CDC, measures IgM directly from the serum sample, without any sample processing needed. Direct capture tests are considered confirmatory.
- In all measles serology tests, indirect and direct, rheumatoid factor and parvovirus, rubella, or roseola infections can cause false positive measles IgM because of cross-reactivity.

Specimen collection

- Serum samples should be collected *at least* 3 days (72 hours) after rash onset for IgM titers to reach the threshold level.
- IgM titers are detectable for at least 28 days after rash onset.

Interpretation

- A high positive IgG in conjunction with a low positive IgM is most likely a false positive result, indicating that IgG was not fully removed prior to testing with the indirect capture method.
- If a negative IgM test is received on a case where the sample was collected in the first 3 days (72 hours) after rash onset, another sample should be collected and tested.
- Test interpretation should be supplemented by a good description of the clinical course of illness in the suspected case.

ARUP IgM serology interpretation*

Value	Interpretation	Recommendations
0.79 AU or less	Negative	• If the patient was clinically compatible and the sample was collected within the first 3 days of rash onset, serum should be re-collected 3-28 days after rash onset and retested. • If the sample was collected within the appropriate time frame (3-28 days after rash onset), a negative test can rule out measles infection.
0.80 – 1.20 AU	Equivocal	• If the patient was clinically compatible, convalescent samples should be collected 10-14 days after the acute samples were collected. • Convalescent samples that are not at least 1.5 times higher than acute samples can rule out measles infection.
1.21 – 2.0 AU	Low Positive – not necessarily diagnostic of an acute infection.	• If the patient was clinically compatible, convalescent samples should be collected 10-14 days after the acute samples were collected. • Convalescent samples that are not at least 1.5 times higher than acute samples can rule out measles infection.
2.1 – 3.0 AU	Moderate Positive – suggestive of an acute infection.	• Serum sample should be sent to CDC for confirmation. • Case should be considered probable and investigation and control measures should be implemented.
3.1 AU or greater	High Positive – strong evidence of an acute infection.	• Serum sample should be sent to CDC for confirmation. • Case should be considered probable and investigation and control measures should be implemented.

*Please note that these cut-off values are for ARUP measles IgM interpretation **ONLY**, and should not be used to interpret test results from other laboratories.

Viral Culture and RT-PCR:

Specimens for viral culture and RT-PCR should be collected for every highly suspect case, but should only be tested once serology results are positive. Samples should be forwarded to the Utah Public Health Laboratory (UPHL), where they will be kept until preliminary serological results are available. If necessary, UPHL will forward samples on to CDC for further testing. More detailed information can be found in **CDC Protocol for Measles Virus Isolation.**

Availability

- CDC is the only laboratory that performs viral culture and RT-PCR.

Limitations

- Viral culture and RT-PCR should not be relied upon for diagnosis; however both are essential in determining the geographic origin of the virus.
- Specimens should only be tested once serological results come back positive for measles.

Specimen collection

- Urine and throat or nasopharyngeal swabs are appropriate specimens for viral culture and RT-PCR. Ideally, specimens should be collected within the first 3 days (72 hours) of rash onset.
- If 10 or more days have passed since rash onset, specimens should not be collected.

Interpretation

- A positive result confirms the diagnosis of measles.
- A negative result does not rule out measles because the tests are not very sensitive and are much affected by the timing of specimen collection and the quality and handling of the clinical specimens.
- Further molecular analysis can determine the origin of the virus.